REMARKS

Summary of Amendments.

Applicants have amended claims 1, 15, 23, 42, 60, 76, 92 and 108 to address the Examiner's 35 U.S.C. § 112, first paragraph concerns and to further provide clarity to the claims. Support for the amendments to the claims is found in the claims as originally filed and in the specification at paragraphs 0016, 0023, 0043-0050, 0053-0054 and 0060. Claims 2, 17, 26, 44, 61, 77, 96, 110, 123 and 134-135 have been cancelled.

Rejection of the Claims.

In the Official Action dated August 24, 2006, the Examiner rejected claims 1-121 under 35 U.S.C. § 112, first paragraph as failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

Claims 1-121 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 3,967,201 ("Rorden").

Claims 122 and 124 were rejected under 35 U.S.C. § 102(b) as being anticipated by Rorden.

Claims 123 and 125-133 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Rorden.

The Applicants respectfully traverses these rejections and in view of the following arguments and amendments requests reconsideration and withdrawal thereof.

Summary of the Invention.

Prior to addressing the substance of the Examiner's rejections, the Applicants believe a brief summary of the current invention would aid in an understanding of the following arguments. With reference to the pending application, the current invention provides novel systems and methods for communicating with equipment and sensors located within a lossy environment. The invention relates to a method for using a wireless telemetry communication system. The wireless communication system provides for communication between and with the transceivers without the buffering of the transmitted signal. As defined in paragraphs 0016 and 0023 of the specification, the wireless telemetry system provides a "real-time" communication between subsurface devices and the surface. Further, the invention relates to a method wherein multiple transceivers are placed in a lossy environment such as a borehole.

As described by the pending claims, the current system does not initially determine the desired distance between transceivers. Rather, the current invention initially determines the attenuation factor (AF) and/or formation resistivity. This initial determination is used to select the transmission signal frequency necessary to transmit the desired data. Following determination of the AF and/or resistivity and desired transmission frequency, the method of the current invention determines the appropriate distance at which to place the transceivers to ensure the signal is suitably transmitted through the lossy environment. Preferably, the distance ensures transmission of a signal with 98% or less attenuation. For further details on the bufferless, real-time transceivers, the Applicants respectfully direct the Examiner's attention to the specification and in particular to paragraphs 0016 and 0023. Further details on the determination of the attenuation factor, attenuation profiles, resistivity in the borehole and positioning of transceivers within the borehole are found in the paragraphs 0043-0050 of the specification.

A summary of the pending independent claims is provided below.

Independent claims 1 and 15 provide a method for positioning wireless transceivers in a lossy environment or borehole. In claim 1, the method determines the attenuation factor (AF) throughout the lossy environment and selects a transmission frequency using the determined AF. In claim 15, the method initially determines the resistivity for a given length of borehole and uses the resistivity to determine the attenuation profile. In claim 1, the AF is used to select a transmission frequency while in claim 15 the attenuation profile is used to select the frequency. Thereafter, the distance between transceivers is determined based on the AF or attenuation profile and selected frequency. Thus, distance between transceivers is not used to determine the transmission frequency. Rather, the desired transmission frequency is used to determine the distance between transceivers such that the signal is attenuated less than or equal to 98%.

Independent claims 23, 42, 92 and 108 are directed to methods for transmitting an electromagnetic signal through a lossy environment such as a borehole or subterranean formation. In claims 23 and 42, the AF is determined and used to select a transmission frequency. Thereafter, the distance between transceivers is selected such that a signal transmitted at the desired frequency experiences 98% or less attenuation between transceivers. In claims 92 and 108, the resistivity of the subterranean formation is measured and used to generate an attenuation profile. The attenuation profile identifies the necessary location of transceivers to provide signal transmission with 98% or less signal attenuation from one transceiver to another. Further, as provided by claims 92 and 108,

transmission of the signal through one transceiver to the next occurs in real time without buffering of the signal. Real time transmission is defined in the specification at paragraph 23.

Independent claims 60 and 76 are directed to methods for real time transmission of an electromagnetic signal through a lossy environment. The claimed methods initially determine the resistivity along the path of the electromagnetic signal. The resistivity is used to select a transmission frequency. According to the method, at least one intermediate transceiver and one target transceiver are placed within the lossy environment. A transceiver is also place at the surface. The distance between each transceiver is selected such that a signal transmitted from one transceiver to the next experiences 98% or less attenuation. In claim 60, the transmitted signal passes from the surface transceiver to the target transceiver in real time without buffering. In claim 76, the signal may be transmitted in either direction, i.e. originating either at the surface or the target transceiver. When passing through the intermediate transceiver, the signal is not buffered. Thus, transmission is achieved in real time as the intermediate transceiver does not store the entire data stream prior to transmitting it to the next transceiver in the system.

Rejection of the Claims Under 35 U.S.C. § 112, First Paragraph.

In the Official Action dated August 26, 2006, the Examiner rejected claims 1-121 under 35 U.S.C. § 112, first paragraph as failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, claims 1, 15, 23, 42, 60, 76, 92 and 108 were rejected as lacking clarity in the relationship of the "determining step" to the other steps in the claims. Applicants have amended claims 1, 15, 23, 42, 60, 76, 92 and 108 to provide the requested clarity. The Applicants request reconsideration and withdrawal of the §112, first paragraph rejection.

Rejection of the Claims Under 35 U.S.C. § 103(a).

Turning first to the rejection of Claim 1, the Examiner has rejected Claim 1 as obvious over the disclosure of Rorden (U.S. Patent No. 3,967,201). Additionally, the Examiner referenced the Gottlieb disclosure. In particular, the Examiner notes that Gottlieb teaches the affect of signal attenuation when signals are transmitted within a lossy environment. The Examiner concluded that "it would have been obvious to determine the attenuation factor to estimate the maximum distance between the receiver and the transmitter."

In the rejection to Claim 1, the Examiner has relied upon Rorden as a primary reference. Although the Examiner has concluded that the combination of Rorden and Gottlieb renders Claim I obvious, the Examiner has not applied any specific portions of Rorden to Claim I. A review of Rorden indicates that Rorden does not use an attenuation factor (AF) and frequency to position transceivers in the borehole. Rather, as disclosed at Column 4, Lines 7-18, Rorden first positions the receivers within the borehole and then selects an optimum transmission frequency. Clearly, the system and method disclosed by Rorden does not initially determine the AF, use said AF to select a desired transmission frequency suitable for transmitting the necessary data and thereafter determined the distance between transceivers necessary to insure transmission of the electromagnetic signal at 98% or less signal attenuation. Therefore, in view of the deficiencies in Rorden, the mere disclosure of dielectric losses resulting from a lossy environment in the Gottlieb disclosure is insufficient to provide for the lack of teaching within Rorden.

The Applicants respectfully submit that the obviousness rejection of Claim 1 is the result of improper hindsight reconstruction of the current invention. Specifically, neither reference teaches nor suggests using the AF to select a transmission frequency **prior** to positioning transceivers a distance apart within the lossy environment. Further, neither reference teaches or suggests determining the AF in the process of selecting the desired transition frequency. Finally, neither reference teaches or suggests using the AF and desired frequency to position the transceivers in the lossy environment at a distance which permits transmission of electromagnetic signals at the selected frequency with a signal attenuation of equal to or less than 98%. In view of the foregoing discussion of the cited art and claim 1, the Applicants respectfully request reconsideration and withdrawal of the rejection of claim 1 over Rorden and Gottlieb.

Turning now to the rejection of Claim 15, the Examiner rejected this claim as being obvious over the combination of Gottlieb and Rorden. The Examiner noted that in Rorden, transceivers are positioned to given distances and an optimum frequency is selected. The Examiner also indicated that Gottlieb teaches a method for modeling attenuation profile based on parameters from the lossy media. Subsequently, the Examiner concluded that it would be obvious to use the determination of the attenuation profile to optimize the frequency and placement of the transceivers as suggested by Rorden.

The applicants respectfully submit that the combination of the prior art in the manner suggested by the Examiner does not teach or suggest the method set forth in Claim 15. As

discussed above, Rorden initially places the transceivers at a predetermined depth and distance apart. Subsequently, Rorden selects an optimum transmission frequency necessary to achieve transmission between the previously positioned transceivers. The addition of Gottlieb merely provides for enhancement of the selected frequency between previously positioned transceivers.

In contrast to the current invention, the combination of the cited art does not provide a process wherein resistivity and attenuation profile are used to initially select a transmission frequency and subsequently position transceivers in a given length of borehole. Further, neither reference teaches or suggests positioning the transceivers at a distance, for the selected frequency, such that a signal is attenuated 98% or less. Therefore, the combination of Rorden and Gottlieb is insufficient to support a prima facie obviousness rejection of Claim 15. In view of the foregoing discussion of the cited art and claim 1, the Applicants respectfully request reconsideration and withdrawal of the rejection of claim 15 over Rorden and Gottlieb.

For the sake of conciseness, the Applicants have grouped the obviousness rejection of the remaining independent claims 23, 42, 92 and 108 over Rorden and Gottlieb. These claims are directed to methods for transmitting an electromagnetic signal through a lossy environment. In claim 92, the lossy environment is identified as a subterranean formation and in claim 108 the lossy environment is a borehole. In each claim, the step of positioning the transceivers takes place after determining either the AF (claims 23 and 42) or determining the resistivity and attenuation profile (claims 92 and 108).

As discussed above, the cited art neither teaches nor suggests a method for positioning transceivers in a lossy environment in the manner described by the current invention. Rather, based on a reading of the cited art, one skilled in the art would be motivated to first position transceivers at a desired location and subsequently determine the frequency necessary to transmit from one location to another. Clearly, the teachings of the cited art contradict the claimed methods of the current invention. Further, neither Gottlieb nor Rorden teach or suggest transmitting data through the borehole or lossy environment in real time. Additionally, neither of the cited references teaches a method for simultaneous transmission of signals through a borehole as provided by the method of claim 108. In view of the foregoing discussion of the cited art and claims 23, 42, 92 and 108, the Applicants respectfully request reconsideration and withdrawal of the rejection of claims 23, 42, 92 and 108 over Rorden and Gottlieb.

Additionally, the Applicants have grouped the obviousness rejection of claims 60 and 76 over Rorden and Gottlieb together for a single discussion. Claims 60 and 76 are directed to methods for transmitting an electromagnetic signal through a lossy environment in real time. Each claim utilizes a determined resistivity to select the desired transmission frequency and subsequently positions a transceiver at the surface, at least one intermediate transceiver in the lossy environment and a target transceiver. Transmissions from one transceiver to another occur in real time, without buffering, and the transmission experiences equal to or less than 98% attenuation. Therefore, in view of the lack of teachings by Rorden and Gottlieb concerning real time transmission and positioning of transceivers, the Applicants respectfully submit that the cited art does not establish a prima facie basis for rejecting the pending claims under §103. Reconsideration and withdrawal of the rejection of claims 60 and 76 is respectfully requested.

Rejection of the Claims Under 35 U.S.C. § 102(b).

The Examiner rejected Claims 122 and 124 under 35 U.S.C. § 102(b) as being anticipated by Rorden. Specifically, the Examiner referred to Figure 1 transceivers 18 and 18' positioned within a borehole.

In contrast to the disclosure of Rorden, the current invention is directed to a wireless telemetry system. This system includes at least two transceivers placed within the lossy environment, the transceivers are capable of receiving/demodulating a signal and subsequently modulating a new signal using the demodulated signal in real time without buffering. Further, the wireless telemetry system includes a distance between the transceivers such that a signal transmitted from one transceiver to another experiences equal to or less than 98% attenuation. Rorden does not teach or suggest a wireless telemetry system which includes transceivers positioned at a distance suitable for transmitting an electromagnetic signal which experience equal to or less than 98% attenuation. Further, Rorden does not teach or suggest the use of transceivers which do not buffer the transmitted signal. Thus, Rorden does not provide a real time transmission system. Therefore, in view of the distinguishable differences between Rorden and the telemetry system of claim 122, the Applicants respectfully request reconsideration and withdrawal of the rejection of claim 122 as being anticipated.

Rejection of Dependent Claims Under 35 U.S.C. § 103(a).

In view of the foregoing arguments and amendments, the Applicants believe that the pending independent claims are now allowable over the cited art. Therefore, the remaining dependent claims are also in allowable condition. Accordingly, the Applicants believe the rejections of the dependent claims are now moot. However, certain claims merit discussion. Specifically, claims 56-58, 70-73, 75, 86-89, 91 and 102-105, 107 are clearly distinguishable over the cited art. The Applicants respectfully submit that the prior art neither teaches nor suggests the methods described by the pending dependent claims.

In particular, pending dependent claims 57-58, 72-73, 88-89 and 104-105 are directed to methods wherein a transceiver automatically switches to a different frequency when a signal is not received within a predetermined time period. The step of automatically switching frequencies is not disclosed by the prior art references relied upon by the Examiner.

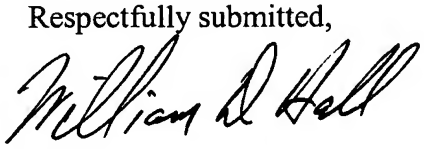
Further, pending dependent claims 56, 70-71, 86-87 and 102-103 are directed to methods wherein a transceiver automatically switches to a different frequency when there is a change in AF in the lossy environment. The step of automatically switching frequencies in response to a change in AF is not disclosed by the prior art references relied upon by the Examiner.

Finally, the methods described by claims 75, 91 and 107 provide for retransmission of a received signal on a different frequency than which the signal was originally transmitted. The prior art relied upon by the Examiner neither teaches nor suggests retransmission of the signal on a different frequency from one transceiver to another.

Conclusion

Therefore, in view of the foregoing amendments to the claims and arguments over the cited art, the Applicants respectfully request that the Examiner reconsider and withdraw the rejection of the pending claims. A formal Notice of Allowance of Pending Claims 1, 3-16, 18-25, 27-43, 45-60, 62-76, 78-95, 97-109, 111-122 and 124-133 is requested. Should the Examiner care to discuss any aspect of the foregoing response in greater detail, the undersigned attorney would welcome a telephone call.

Respectfully submitted,



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